SCHEME OF VALUATION
(Scoring Indicators)

Revision:
Course Code: 1003
Course Title: ENGINEERING PHYSICS I

Qst. No	Scoring Indicator	Split up score	Sub Total	Total
	PART A			
I(i)	Derived quantities - definition	1	1	2
	Example -	1		
I(ii)	Vectors - description	1	1	2
	Scalars - description	1		
I(iii)	Laws of - Triangle of force - Statement	1	1	2
	Figure -	1		
I(iv)	Hookes law - Statement & equation	1 & 1	2	2
I(v)	Equation of Continuity - Statement & $a_1v_1 = a_2v_2$	1 & 1	2	2
	PART B			
II(i)	Equations Motion - under gravity. $v = u + gt$, $h = ut + \frac{1}{2}gt^2$, $v^2 = u^2 + 2gh$, $h = u + g(t-1)$ - Explanation & description	3 3		6
II(ii)	Law of Conservation of linear Momentum	2		6
	Deduction of Recoil velocity $v = -\frac{mv}{M}$ & explanation	4		
II(iii)	Figure -  & Equation $F_x = F\cos\theta$, $F_y = F\sin\theta$	4, 2 & 2		6
II(iv)	Poiseuilli expt - Figure & explanation	4		6
	Equation $V = \pi Pr^4/8\eta l$ & description	2		
II(v)	closed pipes - Figure & $f, 3f, 5f \ldots$, $f = 3v/4l$ .. Description	4 & 2		6
II(vi)	ultrasonic waves - 6 applications, SONAR, Signaling, Medicine ... etc	1 each	1×6	6
II(vii)	Couple, Figure  , Derivation $W = C\theta_2 = 2\pi C$	2 & 4		6
	PART C			
III(a)	SI unit - 7 Fundamental units	3		3
III(b)	Newtons - IIIrd law of Motion $F_1 = -R$ & Example	3		
	Illustration - Figure $F_{12} = -F_{21}$ $m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$ & Explanation	3		6
III(c)	$u = 19.6$ m/s, $t = 10$ S, $g = 9.8$ m/s^2 → Displacement = − height of tower	2		
	$S = ut + \frac{1}{2}gt^2$	2		6
	Substitution & calculation, $-h = 196 - 494$	1		
	$h = 294$ meter	1		

Total

IV (a) Momentum & it's relation with force — $F = \frac{m(v_2 - v_1)}{t}$ — 3 Marks — 3

(b) Distance travelled by a body with a uniform acceleration —
$S_2 - S_1$ $\quad S = ut + \frac{1}{2}at^2$ — 6 Marks — 6
$\therefore (un + \frac{1}{2}an^2) - [u(n-1) + \frac{1}{2}a(n-1)^2$
$\therefore$ Simplify & and Arrive at $S_n = u + a(n - 1/2)$

C. $m = 100$ kg
$u = 0$, $t = 60$ sec $\quad V = u + at$ — 2 Marks
$V = 30$ m/s $\quad \therefore 30 = 0 + 60a$
$a = 0.5$ m/s^2 — 2 Marks
$F = ma = 100 \times .5 = 50$ N — 2 Marks — 6

V (a) Resultant & Equilibrant — Definitions & Figure — 3 Marks

b Analytical Method

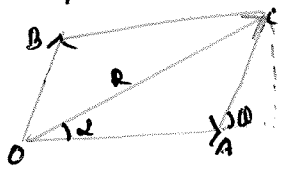


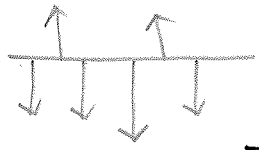
Figure & Derivation, $R = \sqrt{P^2 + Q^2 + 2PQ\cos\theta}$ — 4 Marks
Different cases:
$\theta = 0$ $\quad R = P + Q$, — 2 Mark — 6
$\theta = 90$ $\quad R = \sqrt{P^2 + Q^2}$ .. etc.

C. Here $P = Q = R$ — 1 Mark
$R^2 = P^2 + Q^2 + 2PQ\cos\theta$ — 1 Mark
$\therefore R^2 = R^2 + R^2 + 2R^2\cos\theta = 2R^2[1 + \cos\theta]$ — 2 Mark
$\therefore 1 + \cos\theta = 1/2$, — 1 Mark
$\theta = 120°$ — 1 Mark — 6

VI (a) Lami's Theorem — 

Figure & $\frac{P}{\sin\alpha} = \frac{Q}{\sin\beta} = \frac{R}{\sin\gamma}$ — 3 Mark

(b) Conditions For a body in equilibrium —



1 Sum of upward force = Sum of downward force — 1 Mark
2 Sum of Clockwise Moments = Sum of Anticlockwise Moments — 2 Mark
Explanation, Figure & equation — 3 Mark — 6 Mark

C. $P = 2000$ W $= 2$ KW, $N = 1200$ rpm, $C = ?$ — 1 Mark
$W = 2\pi NC$, $C = W/2\pi N = 2000/2 \times 3.14 \times 20$ — 3 Marks
$N = 1200$ rpm $= 20$ rotation/sec $\quad C = 15.92$ — 2 Marks — 6 Marks

VII (a) Elasticity, Stress = F/A, Strain = $\frac{\text{Change in Dimension}}{\text{Original Dimension}}$

Definition & Explanation ——— 3 Marks 3

(b) Searles Method - Figure & Explanation — 3 Marks

& arrive at formula M/l = Constant

$$Y = \frac{gL}{\pi r^2}\left(\frac{M}{l}\right).$$

——— 3 Marks

6 Marks

C. Let original volume be V

Change in Volume $\Delta V = .01\% \text{ of } V$ } ——— 2 Marks

$= .0001\,V$

$P = 10^7\ N/m^2$ Substitution & calculation

Bulk Modulus $PV/e = \frac{10^7 V}{.0001 V} = 10^{11}\ N/m^2$ — 4 Marks

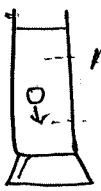
6 Marks

VIII (a) 3 types of energies, KE, PE & Pressure-Volume energy.

$KE = \frac{1}{2} mv^2$ Pressure energy $= P\frac{m}{\rho}$

$PE = mgh$ ——— 3 Marks

(b) Stokes Method Experiment.



Experimental Set up. Explanation, Description ..... etc ——— 1 Mark

Stokes Formula $F = 6\pi\eta rv$

Equation for Coefficient of Viscosity for a highly viscous liquid $\eta = \frac{2}{9}\frac{r^2(\rho - \sigma)g}{V}$ — 2 Marks

6 Marks

C. $\rho = 1250\ kg/m^3$, $V_1 = 0.2\ m/s$, $V_2 = 0.3\ m/s$

$P_2 = 2000\ N/m^2$ ——— 1 Mark

$P_1/d + \frac{1}{2}v_1^2 = \frac{P_2}{d} + \frac{1}{2}V_2^2$ ——— 2 Marks

Substitute & Solve for finding P_2 ——— 2 Marks

$P_2 = 1968.8\ N/m^2$ ——— 1 Mark

6 Marks

IX (a) S.H.M. - Definition & one example. — 3 Marks } 3 Marks

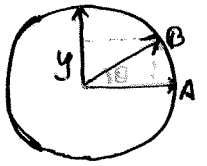
(b) 

Figure - } 2 Marks
& Explanation }.

Derivation & arrives at $y = a\cos\theta$ where $\theta = \omega t$ & $\frac{d^2y}{dt^2} + \omega^2 y = 0$ - eqn of S.H.M } 6 Marks
— 4 Marks

C. $L = 45$ cm, $V = 345$ m/s

a) open ~~at one end~~ - $\lambda = 4l = 4 \times 0.45 = 1.8$ m — 1 Mark
fundamental frequency $f = V/\lambda = \frac{345}{1.8} = 191.7$ Hz
— 2 Mark. } 3

b) open at both ends.
$\lambda = 2l = 2 \times 0.45 = 0.90$ m
fundamental frequency $f = V/\lambda = \frac{345}{0.9} = 383.3$ Hz } 3
— 2 Marks

6 Marks

X (a) Ultrasonic Waves - Production.
Either Piezoelectric Method / or Magnetostriction Method — 3 Marks

(b) Resonance column expt. -

Figure explanation — 2 Marks
Derivation & Formula.
$V = f\lambda$
$3\lambda/4 = l_2 + e$
$\lambda/2 = (l_2 - l_1)$
$\lambda = 2(l_2 - l_1)$
$\lambda/4 = l_1 + e$
$\therefore V = f\,4(l_1 + e)$
$\therefore V = 2f(l_2 - l_1)$
} 4 Marks
} 6 Marks

(c) Audible range of freq 20 Hz — 20000 Hz — 1 mk
$V = f\lambda$, $\lambda = V/f$ $\therefore$ $f_L = 20$ Hz $f_H = 20000$ Hz
$\therefore \lambda_1 = \frac{348}{20\text{ Hz}} = 17.4$ m — 2½ Mark
$\lambda_2 = \frac{348}{20000} = .0174$ m — 2½ Mark
} 6 Marks